

## A STUDY OF *BRACON LEFROYI* (HYMENOPTERA: BRACONIDAE) FROM IRAN<sup>1</sup>

Manzoor Hussain, Ahmad Askari,  
and Gholamhosein Asadi<sup>2</sup>

**ABSTRACT:** Parasitic behavior and biology of *Bracon lefroyi* (Dugeon and Gough) (Hymenoptera: Braconidae), an ectoparasitoid of the larvae of *Earias insulana* Boisduval, was studied in the laboratory. Adults of the parasite mated within 24 hours after emergence from pupal cocoons. The female parasite laid an average of 151-201 eggs during a 27-day oviposition period. Larger host larvae were preferred over smaller ones for oviposition, and a female laid as many as 20 eggs on a host larva. When reared at the room temperature of 21-23°C, egg to adult development required 15-20 days. This period was shortened to 11-15 days at 24°C, and 10-11 days at 28°C, when insects were reared at controlled temperatures in incubators. Higher mortality was recorded when insects were reared at lower temperatures. Eggs could be stored at a temperature of 5°C and 100% RH, but 50% mortality occurred.

**DESCRIPTORS:** Hymenoptera, Braconidae, *Bracon lefroyi*, parasite of *Earias insulana*.

*Earias insulana* Boisduval (Lepidoptera: Arctiidae) is such an important pest of cotton in Iran that in the absence of insecticide applications it has been reported to damage up to 70% of the bolls in some cotton fields in southern Iran (Hussain and Askari, 1975). Its ectoparasitoid *Bracon lefroyi* (Dugeon and Gough) has been reported from India (Husain and Mathur, 1921) and Burma (Stock, 1926), but not previously from Iran.

We found *B. lefroyi* parasitizing *E. insulana* larvae in a cotton field in Kooshkak near Shiraz, and studied its biology and behavior under laboratory conditions.

### Methods and Materials

Cotton bolls infested with *E. insulana* larvae were collected from the cotton field during October 1975, and placed in experimental cages which were paper cups with screened tops. These were allowed to stand in a laboratory where the temperature ranged between 21 and 23°C. The emerging adult *Bracon lefroyi* parasites were transferred with a sterilized wet camel hair brush into new cages and provided with fresh *E. insulana* larvae. A cotton wick soaked in a saturated solution of sucrose was placed on the screen of the cage as a source of food for the parasite. The host larvae were not provided with cotton bolls. After recording the parasitizing behavior of the parasite, the latter was transferred to another cage and provided with

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<sup>2</sup> Assistant Professor, Associate Professor, and Assistant Instructor respectively, Department of Plant Protection, College of Agriculture, Pahlavi University, Shiraz, IRAN.

fresh host larvae. The eggs deposited by the parasite on the host larvae were counted under a microscope and recorded. The life cycle of the parasite was studied at room temperature as well as under two controlled temperature regimes of 24 and 28°C. For the study under controlled temperature regimes, the host larvae with the parasite eggs attached to them were placed in sterilized petri dishes in Model Freas 818 incubators of Precision Scientific Company. The incubators had a fixed 14 h light.

### Results and Discussion

Adult parasite insects resulting from the eggs mated within 24 hours after emergence. Prior to mating, the male, on approaching the female, became very excited and displayed a wing vibrating behavior. One male could mate with several females and mating lasted only a few seconds. Oviposition started 2 weeks after mating. Before oviposition, the parasite paralysed the host larva by repeated stinging and 15 to 20 minutes later, when the host had become immobile, the parasite started to lay eggs on it. The parasite, without exception, oviposited (Fig. 1) between and around the abdominal legs of the host first. Additional eggs, however, were laid on other parts of the host body, starting with the thoracic legs. When a combination of 1st to 5th instar larvae was offered, the parasite decidedly preferred to oviposit on the largest larvae first. Later, additional eggs were laid on the 3rd and 4th instars also. Although the 1st and 2nd instar host larvae were occasionally paralysed, no



Fig. 1. Different stages of *Bracon lefroyi*.  
a - a male parasite; b - a female parasite;  
c - a host larva with the parasite eggs on it;  
d - a host larva with the parasite larvae on it.

eggs were deposited on them if larger host larvae were available. The parasite laid a maximum of 25 eggs in one day, with up to 20 on a host larva. The oviposition period lasted for an average of 27 days, and 151-201 eggs were laid by the female parasite. An average daily oviposition rate is plotted in Fig. 2. Maximum number of eggs were laid between 7th and 15th day after the female started to oviposit. This would correspond in the field with the last week of October.

Data related to the length of various stages of the parasite insect, when reared at different temperatures, are shown in Table 1. At room temperature, the majority of the insects required 15 to 20 days for egg to adult development. This process took 11 to 15 days at 24°C, and 10 to 11 days at 28°C. There was a greater mortality at lower temperatures than at 28°C, indicating susceptibility of the parasite to lower temperature.

Adults readily mated in captivity and the females laid fertilized eggs. However, parthenogenesis was found to occur and adults resulting from unfertilized eggs were all males.

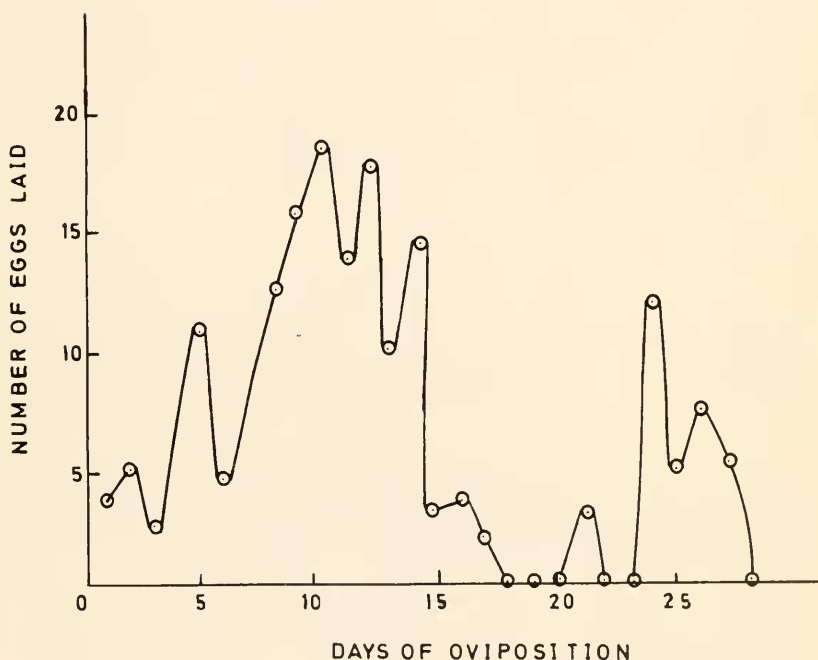


Fig. 2. Average daily oviposition rate of a female *Bracon lefroyi* on *Earias insulana* larvae.

In an attempt to study the effect of storage of the parasite eggs at cold temperature, *E. insulana* larvae with the parasite eggs on them were stored in a cold room at 5°C and 100% RH. After 11 days of storage, these were transferred into an incubator at 24°C. The eggs took 48 hours to hatch but there was a 50% mortality. However, the parasite larvae resulting from these eggs fed in a normal way on *E. insulana* larvae.

Under laboratory conditions, *B. lefroyi* was found to be an active parasite of *E. insulana* larvae, with a high rate of reproduction. However, in the field, the pest insect appears around August in southern Iran, whereas the parasite is not found to be active until late September. Thus, in order to use the parasite as a more effective control agent, it should be reared in the laboratory and released in the field earlier in the season when *E. insulana* larvae are doing a lot of damage to cotton bolls.

Table 1. Period of time required for completion of various life stages of *Bracon lefroyi*, when reared separately at different temperatures.

Temperature	Egg stage (hrs)	Larval stage (hrs)	Pupal stage (days)	% of insects completing egg to adult stage
Room (21-23°C)	48-72	48-72	11-14	36
24°C	24-48	48-72	8-10	59
28°C	24	48-72	7	91

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